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Perceived Causes of Work-Related Sick Leave Among Hospital Nurses in Norway: A Prepandemic Study

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ABSTRACT

Background: Although sick leave is a complex phenomenon, it is believed that there is potential for prevention at the workplace. However, little is known about this potential and what specific measures should be implemented. The purpose of the study was to identify perceived reasons to take work-related sick leave and to suggest preventive measures. The study was completed before the COVID-19 pandemic emerged, and the risk factors identified may have been amplified during the pandemic.

Methods: An in-depth cross-sectional survey was conducted across a randomly selected sample of hospital nurses in Norway. The national sample comprised 1,297 nurses who participated in a survey about their sick leave during the previous 6 months. An open-ended question about perceived reasons for work-related sick leave was included to gather qualitative information.

Results: Among hospital nurses, 27% of the last occurring sick leave incidents were perceived to be work-related. The most common reasons were high physical workload, high work pace, sleep problems, catching a viral or bacterial infection from patients or colleagues, and low staffing.

Conclusions: Over a quarter of the last occurring sick leave incidents among Norwegian hospital nurses are potentially preventable. To retain and optimize scarce hospital nursing resources, strategies to reduce work-related sick leave may provide human and financial benefits. Preventive measures may include careful monitoring of nurses' workload and pace, optimizing work schedules to reduce the risk of sleep problems, and increasing staffing to prevent stress and work overload.

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1. Background

The population is aging in all industrialized countries, and the need for health services will increase as the supply of labor decreases. This trend implies that labor resources must be utilized effectively, especially in the highly labor-intensive health services. However, indicators of current labor underutilization of the health workforce include low retirement age, extensive use of part-time work, and high sick leave rates.

Sick leave is costly, and many work hours are lost every day. The factors contributing to work-related sick leave may be similar to those causing early retirement, reduced labor supply through voluntary part-time work, and intention to leave [1,2]. A systematic and effective effort to reduce work-related sick leave in the health sector may have a major economic impact in most countries.

Registered nurses comprise the largest component of the health workforce, and the international nursing shortage is a reality [3] and increasing the retention rate of nurses in the profession remains a key issue in most countries in the European Union to avoid current and future shortages [4].

More qualitative knowledge about hospital nurses' work-related sick leave may help in identifying appropriate preventive measures. The relationship between sick leave and poor working conditions has been extensively researched in recent decades, and various conditions have been shown to be significantly associated with sick leave. For example, a study of Finnish hospital nurses concluded that there is a direct relationship between increasing workload and increasing sick leave [5]. Other researchers have suggested that sick leave may be related to the considerable psychological job demands placed on nurses and the perceived lack of supervisor support [6]. Interventions to improve the psychosocial work environment have

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been suggested for improving the retention of nurses and tackling the international nursing shortage [7,8].

Gender is an important variable when studying sick leave. Female employees have a higher probability of sick leave than male employees [9–12]. The percentage of male nurses ranges from 10 to 11% in the United Kingdom, Australia, the United States, and Norway [13] to 16% in Germany [14] and to over 20% in Italy and some other countries [15]. Although we have found no studies of gender differences in sick leave among hospital nurses, it has been suggested that the higher sick leave rates by women in general can be interpreted as a sign of inequality within work organizations [16]. It is thus important to study gender differences in work-related sick leave and the link to individual working conditions within the same sector and profession.

Beyond the importance to the individuals involved, sick leave and health problems in the nursing workforce have implications for patient care. Links between the quality of the services provided and available resources, material resources, and communication have been reported [17]. Moreover, an unhealthy work environment has been reported to contribute to medical errors, ineffective delivery of care, conflicts, and stress among healthcare professionals [18]. A French study found that short-term absenteeism among nurses was significantly negatively correlated with patient satisfaction [19].

We have found no studies of the perceived causes for work-related sick leave among nurses in public hospitals in high-income countries. Given that the aim of this study was to identify the causes of work-related sick leave among Norwegian hospital nurses, we asked nurses directly about their sick leave during the previous 6 months. We wanted to know if they perceived their last sick leave incident to be work-related, and if so, how it was related to their job.

2. Methods

2.1. Setting

Norway has primarily a publicly run health sector divided into four geographical regions, each of which is responsible for the hospitals in its own region. Local municipalities are responsible for nursing homes, care centers for the elderly and people with disabilities, school health services, and health stations. Most hospitals in Norway are public hospitals owned and funded by the state. The patients pay a relatively small charge when using hospital services, but frequent users get a medical exemption certificate and do not pay. A small number of hospitals are privately owned, but these are also funded by the public through contracts with regional health authorities. Patients needing an operation at a private hospital can still have it without paying more than at a public hospital.

The labor market in Norway is characterized by labor unions and collective agreements. It is regulated by the Working Environment Act and through agreements between labor unions and employer associations. Collective agreements set rules on matters such as salary, working hours, pensions, and insurance. About 75% of all licensed nurses in Norway are members of the Norwegian Nurses Organisation [20]. Part-time contracts are common in Norwegian health services, and about 45% of all nurses work part-time, according to Statistics Norway.

2.2. Data

An in-depth survey was conducted during the spring of 2015. The survey was part of a larger study in which survey data collected from several occupational groups, including nurses, were planned to be combined with registered data from different databases. This process is achievable through the use of the national identification

Table 1
Sample characteristics (N = 1,297)

Gender	Frequency	Percent
Female	1,156	89.1
Male	139	10.7
Missing values	2	0.2
Total	1,297	100.0
Age (years)		
23–29	195	15.0
30–34	175	13.5
35–39	156	12.0
40–44	158	12.2
45–49	159	12.3
50–54	179	13.8
55–59	170	13.1
≥60	105	8.1
Missing values	0	0.0
Total	1,297	100.0
Number of years working in health services		
<4 years	68	5.2
4–9 years	254	19.6
10–15 years	257	19.8
16–20 years	179	13.8
>20 years	528	40.7
Missing values	11	0.8
Total	1,297	100.0

number (date of birth, a 3-digit individual number, and 2-check digits). A high response rate was not anticipated because few employees are willing to give their personal identification information in a survey that will be combined with highly sensitive health information. A sample of 7,120 of the 35,600 nurses working in public hospitals (20%) was drawn randomly from the member register of the Norwegian Nurses Organisation. The sample size was set to avoid overburdening members with surveys. A cover letter explaining the study with a personal link to the electronic survey was e-mailed to the sampled individuals, and 1,472 nurses (21%) gave their consent to combine survey data with registered data and answered the comprehensive questionnaire. The questionnaire comprised more than 200 questions, and 1,297 nurses answered the question about sick leave during the past 6 months. This paper analyzes only the in-depth survey data, which means that sick leave was self-reported. The National Sickness Benefit Register includes only doctor-certified sick leave and gives no information about whether it is work-related and was therefore not relevant to this study.

2.3. Operationalization

In the survey, the respondents answered the following question about their sick leave: “Have you been on sick leave during the past 6 months?” The possible answers were “No, I have not been on sick leave for the last six months,” “Yes, I have been on sick leave because my children have been sick,” “Yes, 1–3 short sick leave incidents (self-certified sick leave),” “Yes, more than 3 short sick leave incidents (self-certified sick leave),” “Yes, 1 long sick leave incident (doctor-certified sick leave),” “Yes, more than 1 long sick leave incident (doctor-certified sick leave),” or “Yes, I’m on sick leave now (part- or full-time).” Respondents could choose more than one alternative.

Work-related sick leave was identified by the following question: “Was the last sick leave incident related to your working situation?” The possible answers were “Yes,” “Partly,” or “No.” For “Yes” or “Partly,” respondents were asked to give the reason in their own words. This open-ended question was used in the analysis

presented here, and respondents' quotes were translated into English by the researchers.

2.4. Analyses

The answers given were typically short and in the form of keywords, and no advanced analysis was needed. The responses were coded into suitable categories using Excel following Step 5 in the 10-step method for structuring and coding of qualitative data [21].

3. Results

3.1. Sample characteristics

The participants' characteristics are presented in Table 1; 89.1% of the respondents were female, 15% were less than 30 years of age, and 40.7% had more than 20 years of work experience in health services.

3.2. Sick leave

Data relating to sick leave are presented in Table 2; 29.5% of the nurses ($n = 382$) had not been on sick leave during the past 6 months. The most common type of sick leave was one to three short incidents lasting less than 8 days (44.9% of all nurses) and one long-term sick leave incident (16.5% of all nurses). More than three short-term incidents or more than one long-term incidence were reported infrequently, 3.3% and 2.3%, respectively, and 6.3% of the sample were on sick leave when they completed the survey. Given that more than one type of sick leave could be reported, we calculated that 11.1% of the nurses reported sick leave both because of their own illness and because of sick children, while 4.7% of the nurses ($n = 61$) reported sick leave only because of their child's illness. Including the 29.5% who reported that they have not been on sick leave during the past 6 months, 34.1% of the nurses did not have sick leave because of their own health problems. The rest of the nurses (65.9%) reported any type of sick leave from work because of their own health problems during the previous 6 months ($n = 855$).

Of those who had more than one sick leave incident because of their own illness during the previous 6 months, 27.1% ($n = 232$) reported that it was totally (7%) or partly work-related (20.1%).

3.3. Work-related sick leave

More female than male nurses reported having sick leave that was not perceived to be work-related, but the difference was relatively small; 48.7% of female nurses and 43.2% of male nurses reported more than one incident of this type of sick leave during the previous 6 months, see Table 3. However, 27.2% of all female nurses and 25.9% of all male nurses who had sick leave during the previous 6 months reported that their sick leave was work-related. This equated to 18.2% of all female nurses and 15.1% of all male nurses and indicated a small gender difference. Thus, although the probability of taking work-related sick leave did not differ significantly between female and male nurses, female nurses had a higher probability of taking sick leave.

Age is an important predictor of work-related sick leave. About 25.1% of the nurses in the youngest age group and 10.5% of the nurses in the oldest age group reported work-related sick leave. A similar difference was found in the comparison between less experienced (worked less than 4 years) and highly experienced nurses (worked more than 20 years), and this difference reflects the natural relationship between age and the number of years working in health services.

Of those who had more than one sick leave because of their own illness during the previous 6 months ($n = 232$), 88.8% ($n = 206$) included a brief description of the reason.

A range of reasons for work-related sick leave was reported. One easily understandable cause was viral infections, such as the common cold, influenza, croup, laryngitis, chest cold (bronchitis), and sore throat. Hospital nurses have close contact with sick patients and their colleagues who may have contagious diseases. Many of the nurses noted that they might be more susceptible to infections in periods involving a high workload, as noted by one nurse.

Exposed to cold and flu virus at work and also more vulnerable when I am tired because of the work situation.

Some of the respondents ascribed sleep problems to a heavy workload as a reason for ill health.

Many tasks at work, little sleep, stress headache.

Others reported that they had trouble with disturbed sleep patterns after a night shift.

Table 2
Answers to the questions "Have you been on sick leave during the past 6 months?" and "Was the last sick leave incident related to your working situation?" ($N = 1,297$)

	Frequency*	Percentage
Have you been on sick leave during the past 6 months?*		
No, I have not been on sick leave during the past 6 months	382	29.5
Yes, I have been on sick leave because my children have been sick	205	15.8
- Of these, have been on sick leave only because children have been sick	61	4.7
- Of these, have been on sick leave because of children have been sick and because of own illness	144	11.1
Yes, 1–3 short sick leave incidents (self-certified sick leave)	582	44.9
Yes, more than 3 short sick leave incidents (self-certified sick leave)	43	3.3
Yes, 1 long sick leave incident (doctor-certified sick leave)	214	16.5
Yes, more than 1 long sick leave incident (doctor-certified sick leave)	30	2.3
Yes, I'm on sick leave now (part- or full-time)	82	6.3
- Of all, have had sick leave incidents during the past 6 months, or on sick leave now	855	65.9
- Of all, have not been on sick leave due to own illness during the past 6 months	442	34.1
Was the last sick leave incident related to your working situation?		
Yes	60	7.0
Partly	172	20.1
No	623	72.9
Total	855	100.0

* Respondents could give more than one answer.

Table 3

Distribution of nurses with and without sick leave and type of sick leave during the past 6 months and chi-square tests of differences in probability of types of sick leave (N = 1,297)

	Not sick leave <i>n</i> (%)	Sick leave		Not sick leave vs. sick leave		Not work-related vs. work-related sick leave	
		Not work-related <i>n</i> (%)	Work-related <i>n</i> (%)	χ^2 (df)	<i>P</i> value	χ^2 (df)	<i>P</i> value
<i>Gender</i>				3.97 (1)	0.046	0.06 (1)	0.810
Female	383 (33.1)	563 (48.7)	210 (18.2)				
Male	58 (41.7)	60 (43.2)	21 (15.1)				
Total	441 (34.1)	623 (48.1)	231 (17.8)				
<i>Age (years)</i>				14.55 (7)	0.042	20.44 (7)	0.005
23–29	49 (25.1)	97 (49.7)	49 (25.1)				
30–34	61 (34.9)	72 (41.1)	42 (24)				
35–39	54 (34.6)	80 (51.3)	22 (14.1)				
40–44	46 (29.1)	87 (55.1)	25 (15.8)				
45–49	59 (37.1)	74 (46.5)	26 (16.4)				
50–54	74 (41.3)	70 (39.1)	35 (19.6)				
55–59	63 (37.1)	85 (50)	22 (12.9)				
≥60	36 (34.3)	58 (55.2)	11 (10.5)				
Total	442 (34.1)	623 (48)	232 (17.9)				
<i>Number of years working in health services</i>				17.89 (4)	0.003	12.93 (4)	0.024
<4 years	10 (14.7)	42 (61.8)	16 (23.5)				
4–9 years	85 (33.5)	105 (41.3)	64 (25.2)				
10–15 years	84 (32.7)	129 (50.2)	44 (17.1)				
16–20 years	56 (31.3)	96 (53.6)	27 (15.1)				
>20 years	202 (38.3)	245 (46.4)	81 (15.3)				
Total	437 (34)	617 (48)	232 (18)				

Minimal sleep ahead of the day shift after unsuccessful attempts to turn back my circadian rhythm after many night shifts.

Some reported having headaches and migraines after working nights.

Tend to get migraines after night shifts.

Many nurses were exhausted after many years of working as a hospital nurse.

Heavy workload over a long period; 26 years in very busy department, physically very demanding.

Others described health problems that became worse because of the difficulty in making the necessary adjustments at work. For example, pregnancy in a nurse may impose needs that are difficult to accommodate in hospitals.

Difficult to adjust workload for a pregnant employee near her time on a busy ward.

High workload when pregnant; I was exhausted.

Others were in a situation where they had to accept extra shifts at short notice.

Unpredictable work situation over a long period because I only have a small part-time position at the hospital, and thus have to take extra shifts. This causes concern, must arrange babysitting, rearrange days, I am exhausted by 1 night working, 1 night off, 2 nights working, etc.

Others recounted a more complex situation involving both the physical work environment and ethical concerns.

Heavy workload over a long period. Hard floors and very high pace. Often a workload that made it very hard to have any energy; in my view, close to irresponsible.

Management problems and poor leadership also appeared to contribute to work-related sick leave.

My superior does not have a friendly management style, and this affects the entire staff.

For some respondents, how a leader responds when health problems arise was also important.

Symptoms of stress/anxiety/burnout. I tried to get support from my leader, but I didn't get it. I ended up on long-term sick leave.

High sick leave rates for some nurses also seemed to generate more sick leave by imposing higher workload on colleagues.

Muscle/skeletal problems. Heavy load at work in relation to heavy care, high sick leave rates among colleagues and additional tasks because many unskilled substitutes were hired.

Stress was considered to produce different outcomes depending on the work environment in which it has to be handled; however, sometimes, stress by itself affected the use of sick leave.

Much stress over many years. Mentally demanding patients and constant downsizing. Little understanding by management. Increasingly imposed new duties. Constant reorganization is perceived as meaningless each time.

One nurse questioned whether their health problems were work-related.

Sick 1 time during the past 6 months. I got a heavy viral infection after a period involving very tough shifts, both mentally and physically. Is there a connection?

Table 4 presents the 206 responses that were coded into appropriate categories. Many of the descriptions involved several causes. The most frequent combination was a high physical workload and a high work pace. The third most frequent cause was sleep

problems, which were usually related to working night shifts or not getting enough sleep between shifts.

4. Discussion

Our study focused on the work-related part of sick leave and found that 27% of all last sick leave incidents among licensed hospital nurses were perceived work-related. However, this is probably a low estimate because the respondents did not necessarily link their health to their work situation. The low response rate also implies that this was a low estimate because nonresponders typically have higher sick leave than responders [22]. The 5 most common reasons given for work-related sick leave were high physical workload, high work pace, sleep problems, catching a viral or bacterial infection from patients or colleagues, and low staffing. Older age and longer work experience seemed to reduce the risk of work-related sick leave, but we observed no significant gender differences. In the following, we discuss these results in the context of the research literature.

A systematic literature review concluded that the reasons underlying absenteeism among staff nurses are poorly understood [23]. A qualitative study of the nurse managers' perspective showed that work-related factors, together with individual and organizational factors, contribute to nurses' sickness absenteeism [24].

4.1. High physical workload

The high physical workload was found to be associated with musculoskeletal problems among nurses in several studies [25–28], and it is thus not surprising that this is the most common reason given for work-related sick leave in our study. Musculoskeletal pain was also previously found to be the most common cause of incapacity among nurses [29].

4.2. High work pace

Less is known about high work pace. However, it is clear that fast work pace and tempo differ from long working hours and overtime [30]. Some studies neglect work pace as a physical working condition and include time pressure as a psychosocial work environment condition [31]. Future studies on working conditions for

nurses should include work pace as this is the second most common reported reason for work-related sick leave. Hospital nurses do not have time pressure because of deadlines but because too many tasks must be completed in a short time. Work pace, therefore, relates to a physical working condition and not a psychosocial working condition. This is in line with another study of nurses that concluded that in addition to the softer work characteristics (such as decision latitude, social capital, and team cohesion), more insight and knowledge of the hard work characteristics of workload are essential [32].

4.3. Sleep problems/too little sleep

Sleep problems are common among shift workers [33], and the consequences of sleep deprivation and sleepiness are the most important health problem among shift workers [34]. One study found that about one-third of nurses showed symptoms indicative of shift work disorder and that the highest prevalence was related to schedules involving night shifts [35]. Another study found a relationship between disturbed sleep and pain [36].

4.4. Infection at work (viral or bacterial)

All healthcare workers face a wide range of hazards on the job, including exposure to blood and body fluids, and nurses experience these hazards most frequently [37]. The risk of acquiring an infectious disease by airborne transmission may be greater for nurses than for the general population because of their more frequent and intensive professional contacts with potentially infected patients [38]. However, stress can also affect the immune system [39] and thus increases the likelihood of becoming infected once exposed. Nurses are subjected to high levels of general stress arising from the physical, psychological, and social aspects of the work environment [40]. It is, therefore, not surprising that catching an infection at work from patients or colleagues was the fourth most frequent self-reported reason for work-related sick leave in our study.

4.5. Low staffing

Hospital nurse staffing has been linked to patient mortality, nurse burnout, job dissatisfaction [41,42], patient safety [43,44], and patient survival [45]. It is reasonable to assume that low staffing is related to high individual physical workload and high work pace. However, our study does not include information about staffing. A reduced physical workload and work pace may be achieved through higher staffing or better organization of work tasks. A reduced workload and better rotation schedules may help to prevent sleep problems among nurses.

4.6. Gender

Gender issues remain a neglected area in most approaches to health workforce policy, planning, and research [46]. However, the economic burden of sick leave is considerable in the Scandinavian countries, and the authorities want to reduce these costs [47]. Therefore, the gender differences in sick leave rates, which show higher rates for female employees, receive much political attention. Much of the research reporting large gender differences in sick leave rates has not controlled for systematic gender differences in the labor market in terms of education, occupation, and working conditions [9–12]. In this study, we compared female and male nurses employed within the same sector. Although our sample was too small to conclude that the gender differences in sick leave disappear after controlling for these factors, we observed a trend toward smaller gender differences when comparing male and

Table 4
Reasons given for work-related sick leave ($n = 206$)

	Frequency*	Percent
High physical workload	85	41.3
High work pace	52	25.2
Sleep problems/too little sleep	38	18.4
Infection at work (viral or bacterial)	33	16.0
Low staffing	21	10.2
Pregnant – adjustment was difficult	18	8.7
Difficult to make workplace adjustment for health problems	14	6.8
Mental workload	9	4.4
Injury at work	8	3.9
Poor leadership	6	2.9
Poor work environment	6	2.9
High sick leave rate among colleagues	4	1.9
Too much responsibility	4	1.9
Reorganization	3	1.5
Adverse reaction to influenza vaccine	1	0.5
Unpredictable work hours	1	0.5

* Respondents could give more than one answer.

female employees within the same profession and sector. We have found no studies that analyzed gender differences in sick leave among hospital nurses, but gender is often included as an independent variable in these analyses, even if the intent of the study was not to identify gender differences. It should also be noted that the labor force participation rate is high in the Scandinavian countries compared with other countries, especially for women and older workers [48].

4.7. Strengths and limitations

The study was based on a large and homogeneous sample of nurses, which limits the influence of possible confounding variables such as different work environments and work schedules. On the other hand, this homogeneity makes generalization to other occupations more problematic. We suggest that the information given in responses to the open-ended questions provides a better understanding of the perceived risk factors involved than do closed-ended questions with a limited set of responses.

One major limitation of this study was the low response rate (21%). However, this is not surprising given that our survey involved a large internet-based questionnaire comprising more than 200 questions. Although the respondents were thorough and answered most questions, we do not know how representative the sample was in global terms. However, the sample was representative in terms of gender, age, and work and residence locations in Norway based on the member statistics provided by the Norwegian Nurses Organisation. We do not have other information from the register.

Another limitation is that we do not know whether the sick leave incidents were actually work-related; we know only whether the employee assessed the sick leave incident as work-related or not. We suspect that the employees underestimated the indirect effects of work on their health, but we do not know this for certain.

We did not analyze differences in perceived contributors to sick leave between hospitals, clinics, or teams. However, there are reasons to expect considerable variation in the working conditions between units within a hospital and between hospitals. Only nurses working at public hospitals were included, and we do not know whether the results are valid for private hospitals.

4.8. Further research

We suggest that further research on sick leave should concentrate on building theoretical and empirical models for factors contributing to work-related and not work-related sick leave separately. This would provide a more practical understanding that may be useful for preventive programs to address sick leave in the workplace.

5. Conclusion

In this study, about 27% of sick leave incidents among licensed hospital nurses were found to be work-related. The five most common reasons given for work-related sick leave were high physical workload, high work pace, sleep problems, catching a viral or bacterial infection from patients or colleagues, and low staffing. We suggest the following preventive measures to reduce work-related sick leave among hospital nurses: (1) carefully monitor individual physical workload and work pace and adjust if needed; (2) plan and optimize high-quality work schedules to reduce the risk of sleep problems among employees; and (3) increase staffing when needed to prevent stress and work overload on nurses.

Ethics approval and consent to participate

This study was approved by the Regional Committees for Medical and Health Research Ethics in Mid-Norway (REC) (Reference number 2014/2017).

Consent for publication

The respondents gave consent to data linkage at the beginning of the electronic survey. Only these respondents are included in the study.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions

All authors contributed to the analyses of the data and to the writing of the manuscript. SOO and HF wrote the project proposal and collected the data.

Conflicts of interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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References

- [1] Josephson M, et al. The same factors influence job turnover and long spells of sick leave—a 3-year follow-up of Swedish nurses. *Eur J Public Health* 2008;18(4):380–5.
- [2] Suadicani P, et al. Psychosocial work conditions associated with sickness absence among hospital employees. *Occup Med* 2014;64(7):503–8.
- [3] Benton DC, Shaffer FA. Human resources for health 2030 and the regulatory agenda. *J Nurs Manag* 2016;24(6):705–7.
- [4] OECD and E. Union. Health at a glance: Europe 2020; 2020.
- [5] Rauhala A, et al. What degree of work overload is likely to cause increased sickness absenteeism among nurses? Evidence from the RAFAELA patient classification system. *J Adv Nurs* 2007;57(3):286–95.
- [6] Rugless MJ, Taylor DM. Sick leave in the emergency department: staff attitudes and the impact of job designation and psychosocial work conditions. *Emerg Med Australas* 2011;23(1):39–45.
- [7] Li J, et al. Psychosocial work environment and intention to leave the nursing profession: a cross-national prospective study of eight countries. *Int J Health Serv* 2013;43(3):519–36.
- [8] Michie S, Williams S. Reducing work related psychological ill health and sickness absence: a systematic literature review. *Occup Environ Med* 2003;60(1):3–9.
- [9] Allebeck P, Mastekaasa A. Chapter 5. Risk factors for sick leave-general studies. *Scand J Public Health* 2004;32(63_Suppl. 1):49–108.
- [10] Mastekaasa A. The gender gap in sickness absence: long-term trends in eight European countries. *Eur J Public Health* 2014;24(4):656–62.
- [11] Boschman J, et al. The mediating role of recovery opportunities on future sickness absence from a gender-and age-sensitive perspective. *PLoS One* 2017;12(7):e0179657.

- [12] Arcas MM, et al. Gender differences in the duration of non-work-related sickness absence episodes due to musculoskeletal disorders. *J Epidemiol Community Health* 2016;70(11):1065–73.
- [13] Shields L, Hall J, Mamun AA. The 'gender gap' in authorship in nursing literature. *J R Soc Med* 2011;104(11):457–64.
- [14] Maier T, Afentakis A. Forecasting supply and demand in nursing professions: impacts of occupational flexibility and employment structure in Germany. *Human Resources Health* 2013;11(1):24.
- [15] Daly J, Speedy S, Jackson D. *Contexts of nursing: an introduction*. Elsevier Health Sciences; 2017.
- [16] Vanje A. Sick leave—a signal of unequal work organizations? Gender perspectives on work environment and work organizations in the health care sector: a knowledge review. *Nord J Work Life Stud* 2015;5(4):85–104.
- [17] Kalisch BJ, et al. Hospital variation in missed nursing care. *Am J Med Qual* 2011;26(4):291–9.
- [18] Ulrich BT, et al. Critical care nurse work environments 2013: a status report. *Crit Care Nurse* 2014;34(4):64–79.
- [19] Moret L, et al. Relationship between inpatient satisfaction and nurse absenteeism: an exploratory study using WHO-PATH performance indicators in France. *BMC Res Notes* 2012;5:83.
- [20] Bergene AC, Egeland C. Interventionism as a union strategy?. In: *The strategies of the Norwegian Nurses Organisation in relation to temporary agency work*. Transfer: European Review of Labour and Research; 2016:1024258916667027.
- [21] Ose SO. Using excel and word to structure qualitative data. *J Appl Sociol* 2016;10(2):147–62.
- [22] Stapelfeldt CM, et al. Validation of sick leave measures: self-reported sick leave and sickness benefit data from a Danish national register compared to multiple workplace-registered sick leave spells in a Danish municipality. *BMC Public Health* 2012;12:661.
- [23] Davey MM, et al. Predictors of nurse absenteeism in hospitals: a systematic review. *J Nurs Manag* 2009;17(3):312–30.
- [24] Baydoun M, Dumit N, Daouk-Öyry L. What do nurse managers say about nurses' sickness absenteeism? A new perspective. *J Nurs Manag* 2016;24(1):97–104.
- [25] Engels JA, et al. Work related risk factors for musculoskeletal complaints in the nursing profession: results of a questionnaire survey. *Occup Environ Med* 1996;53(9):636–41.
- [26] Menzel NN, et al. The physical workload of nursing personnel: association with musculoskeletal discomfort. *Int J Nurs Stud* 2004;41(8):859–67.
- [27] Ando S, et al. Associations of self estimated workloads with musculoskeletal symptoms among hospital nurses. *Occup Environ Med* 2000;57(3):211–211.
- [28] Songkham W, Yavichai S. O37-6 the variety of physical workload and musculoskeletal disorders as perceived by Thai nursing personnel. *BMJ Publishing Group Ltd*; 2016.
- [29] Freimann T, Pääsuke M, Merisalu E. Work-related psychosocial factors and mental health problems associated with musculoskeletal pain in nurses: a cross-sectional study. *Pain Research and Management*; 2016. 2016.
- [30] Kristensen TS, et al. The distinction between work pace and working hours in the measurement of quantitative demands at work. *Work Stress* 2004;18(4):305–22.
- [31] Bambra C, et al. Work, health, and welfare: the association between working conditions, welfare states, and self-reported general health in Europe. *Int J Health Services* 2014;44(1):113–36.
- [32] Van Bogaert P, et al. Predictors of burnout, work engagement and nurse reported job outcomes and quality of care: a mixed method study. *BMC Nurs* 2017;16(1):5.
- [33] Boivin D, Boudreau P. Impacts of shift work on sleep and circadian rhythms. *Pathol Biol* 2014;62(5):292–301.
- [34] Yazdi Z, et al. Prevalence of sleep disorders and their impacts on occupational performance: a comparison between shift workers and nonshift workers. *Sleep Disord* 2014;2014:1–5.
- [35] Flo E, et al. Shift work disorder in nurses—assessment, prevalence and related health problems. *PLoS One* 2012;7(4):e33981.
- [36] Katsifaraki M, et al. The association of sleepiness, insomnia, sleep disturbance and pain: a study amongst shiftworking nurses. *Sleep and Biological Rhythms*; 2018. p. 1–8.
- [37] Stone PW, et al. Nurses' working conditions: implications for infectious disease. *Emerg Infect Dis* 2004;10(11):1984.
- [38] Bernard H, et al. Nurses' contacts and potential for infectious disease transmission. *Emerg Infect Dis* 2009;15(9):1438.
- [39] Glaser R, Kiecolt-Glaser JK. Stress-induced immune dysfunction: implications for health. *Nat Rev Immunol* 2005;5(3):243.
- [40] Moustaka E, Constantinidis TC. Sources and effects of work-related stress in nursing. *Health Sci J* 2010;4(4):210.
- [41] Aiken LH, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Jama* 2002;288(16):1987–93.
- [42] Rafferty AM, et al. Outcomes of variation in hospital nurse staffing in English hospitals: cross-sectional analysis of survey data and discharge records. *Int J Nurs Stud* 2007;44(2):175–82.
- [43] Hall LM, Doran D, Pink GH. Nurse staffing models, nursing hours, and patient safety outcomes. *J Nurs Admin* 2004;34(1):41–5.
- [44] Cho E, et al. Nurse staffing level and overtime associated with patient safety, quality of care, and care left undone in hospitals: a cross-sectional study. *Int J Nurs Stud* 2016;60:263–71.
- [45] McHugh MD, et al. Better nurse staffing and nurse work environments associated with increased survival of in-hospital cardiac arrest patients. *Med Care* 2016;54(1):74.
- [46] Gupta N, Alfano M. Access to non-pecuniary benefits: does gender matter? Evidence from six low-and middle-income countries. *Human Resources Health* 2011;9(1):25.
- [47] Krane L, et al. Sickness absence patterns and trends in the health care sector: 5-year monitoring of female municipal employees in the health and care sectors in Norway and Denmark. *Human Resources Health* 2014;12(1):37.
- [48] OECD. *Sickness, disability and work: breaking the barriers: a synthesis of findings across OECD countries*. OECD Publishing; 2010.